Remarks

By way of the foregoing amendments, the disclosure, drawings and claims have been amended to address the various informalities noted by the Examiner. The changes suggested by the Examiner were appreciated. Withdrawal of the several objections and the rejection under 35 USC 112 is respectfully requested.

Turning to the prior art rejections, it is respectfully submitted that the duplexer dielectric filter recited in the claims is fundamentally different from the devices disclosed in US 5146193 (Sokola et al.), 5250916 (Zakman et al.), 5721520 (McVeety et al.). The prior art references do not disclose or suggest providing a duplexer dielectric filter with a higher frequency band in a reception area than in a transmission area by providing an open area free from the conductive layer on the side surface of a dielectric block within only the reception area.

Sokola et al. disclose a duplexer dielectric filter comprising an open area disposed on the side surface of the dielectric block. However, there is no teaching or suggestion of an open area disposed only within the reception area, i.e. between the antenna terminal and the reception terminal, In the Sokola et al. device, the open area extends across all resonators, such that the coupling electrodes 18, 19 and 20 are all disposed therein. Accordingly, the open area of Sokola affects the coupling to and between all resonators, including ones within the transmission area.

In contrast, an open area in the claimed filter acts as a means for obtaining a high frequency of resonators within only the reception area.

In the duplexer filter of McVeety et al., no indication is made as to whether each resonator acts as the transmission filter or the reception filter. In Fig. 12, the unmetallized area is a means for affecting the coupling of all the resonators.

Zakmann et al. discloses a multi-passband dielectric filter of the type described in the background section of the present specification. For the reasons discussed therein, there is not teaching or suggestion of the invention as claimed.

Favorable reconsideration of the art rejections is respectfully requested.

This application is now believed to be in condition for allowance and an early action to that effect is earnestly solicited.

Respectfully submitted,

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By
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CERTIFICATE OF MAILING

I hereby certify that this paper (along with any paper or item referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first-class mail in an envelope addressed to Commissioner for Patents, Washington, D.C. 20231.

Date: 3-18-02

Don W. Bulson

A. Clean Version of Replacement Paragraph/Section/Claim with Instructions for Entry

Please amend the application as follows:

In the Drawings:

Attached for approval by the Examiner are prints showing proposed drawing changes.

In the Specification:

Rewrite the paragraph on page 1 at lines 16 - 23 to read:

As is well known to those skilled in the art and the general public, mobile communication systems using super high frequency band waves have been largely substituted for conventional wire communication systems. Therefore, cellular phones are widely used and are subjected to active research and development to improve their operational performance and achieve the desired compactness, smallness and lightness thereof.

~~*Rewrite the first paragraph on page 3 to read:*~~

A conductive pattern 9, having a predetermined size, is formed on the upper surface 3 of the dielectric block 1 at a position around each of the resonating holes 7. Such conductive patterns 9 are connected to the conductive layers on the internal surfaces of the resonating holes 7, thus forming a loading capacitance between the resonating holes 7 and the conductive layer of the side surface 5, and forming a coupling capacitance between neighboring resonators. The resonance frequency of the resonators is determined by both the resonating holes 7 and the loading capacitance, while the coupling capacitance couples the resonators to each other. The transmission area 10 and the reception area 20 of the upper and side surfaces 3 and 5 of the dielectric block 1 are provided with transmission and reception terminals 12a and 12b for accomplishing the signal transmission and reception operation. An antenna terminal 12c, consisting of a conductive pattern, is formed at a position between the transmission and reception areas 10 and 20. The transmission terminal 12a, the

reception terminal 12b and the antenna terminal 12c are insulated from the conductive material disposed on the side surface 5 of the dielectric block by open areas 14a, 14b and 14c, respectively.

Rewrite the paragraph spanning pages 3 and 4 as follows:

Fig. 2 is an equivalent circuit diagram of the duplexer dielectric filter of Fig. 1. In Fig. 2, the reference character "R" denotes transmitting lines, each of which is always opened at one end thereof by an associated resonating hole 7 of the dielectric block 1. As described above, he antenna terminal is disposed between the transmission area and the reception area. The elements related to the resonating holes 7 within the transmission area are indicated by the reference labels including the character "t", for example, Cti, Ctij, Rti and Mtij, while the elements related to the resonating holes 7 within the reception area are indicated by the reference labels including the character "r", for example, Cri, Crij, Rri and Mrij. The loading capacitance Cti, Cri (i = 1, 2, 3), formed between the resonating holes 7 and the conductive layer on the side surface 5 of the dielectric block 1, is connected to the open ends of the signal transmitting lines. A desired resonating circuit is formed by both the signal transmitting lines Rti, Rri (i = 1, 2, 3) and the loading capacitance.

Rewrite the paragraph on page 4 at lines 5-20 as follows:

In a conventional duplexer dielectric filter, it is necessary to accomplish both desired signal transmitting characteristics within a transmission frequency band and desired attenuation characteristics within a low frequency band. The desired transmission characteristics within the transmission frequency band are determined by a coupling of the resonance frequency of the resonators, determined by both the signal transmitting lines Rti, Rri and the loading capacitance Cti, Cri, the coupling capacitance Ctij, Crij (i,j = 1, 2, 3), and electromagnetic coupling values Mtij, Mrij (i,j = 1, 2, 3). The desired attenuation characteristics within the low frequency band are determined by a coupling. That is, both the attenuation characteristics and the frequency of an attenuation pole are determined by a combination of the coupling capacitance and magnetic coupling values.

~~Rewrite the paragraph on page 5 at lines 7-15 as follows:~~

In such a conventional duplexer dielectric filter of Fig. 1, the determination of the resonance frequency or the coupling between the resonators are changed in accordance with the size of the conductive patterns 9 formed on the upper surface 3 of the dielectric block 1. In other words, the operational characteristics of the duplexer dielectric filters are changed in accordance with both the gap between the conductive patterns 9 and the conductive layer of the side surface 5, and the gap between the conductive patterns 9.

Rewrite the paragraph on page 12 at lines 5-17, as follows:

At least one conductive pattern 109, having a predetermined size, is formed on the upper surface 103 of the dielectric block 101 at a position around each of the resonating holes 107. Such conductive patterns 109 are connected to the conductive layers on the internal surfaces of the resonating holes 107, thus forming loading capacitance between the resonating holes 107 and the conductive layer of the side surface 105 and forming coupling capacitance between neighboring resonators. The upper and side surfaces 103 and 105 of the dielectric block 101 are provided with transmission and reception terminals 112a and 112b for accomplishing the transmission and reception operation in addition to an antenna terminal 112c. The transmission terminal 112a, the reception terminal 112b and the antenna terminal 112c are insulated from the conductive material disposed on the side surface 5 of the dielectric block by open areas 114a, 114b and 114c, respectively.

Rewrite the paragraph spanning pages 12 and 13 as follows:

The duplexer dielectric filter of this invention has two filtering areas: a reception area and a transmission area.

Rewrite the paragraph spanning pages 13 and 14 as follows:

An open area 125 free from any conductive layer is formed on the side surface 105 of the dielectric block 101 within the reception area 120 and is integrated with the

A7 cont

other open areas 114b and 114c. The open area 125 controls both the loading capacitance formed between the conductive patterns 109 within the reception area 120 and the ground electrode of the side surface 105 and the coupling capacitance between the conductive patterns 109. The control of both the loading capacitance and the coupling capacitance will be described in detail as follows, with reference to Figs. 5A and 5B.

Rewrite the paragraph on page 14 at lines 8-19 as follows:

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Similar to the transmission area of the duplexer dielectric filter as shown in Fig. 3, when two resonators R1, R2 are formed between the ground electrodes in the same manner as expected from a conventional duplexer dielectric filter as shown in Fig. 5A, a loading capacitance Ct1, Ct2 (Ct1 is a random value) is formed between the resonators R1, R2 and the ground electrodes. In addition, a coupling capacitance Ct12 (Ct12 is a random value) is formed between the resonators R1, R2. On the other hand, similar to the reception area of the duplexer dielectric filter as shown in Fig. 3, when the ground electrode is partially open as expected from the present invention as shown in Fig. 5B, a loading capacitance Cr3, Cr4 is formed between the resonators R3, R4 and the ground electrodes. In addition, a coupling capacitance Cr34 is formed between the resonators R3, R4.

Rewrite the paragraph on page 15 at lines 10-19 as follows:

A9

The loading capacitance, formed between the conductive patterns 109 and the ground electrodes, is changed in accordance with the distance between the conductive patterns 109 and the ground electrodes. It is thus possible to control the loading capacitance of the resonating holes 107 by changing the distance between the ground electrodes and the resonating holes 107 within the reception area 120. This may be accomplished by changing the shape of the open area 125, for example, by forming a step on the open area 125 as shown in Fig. 3.

Replace the paragraph on page 17 ~~at lines 4-24 with the following paragraphs:~~

As described above, the shape of the open area 125 in the duplexer dielectric filter of this invention is not limited. In the primary embodiment of Fig. 3, the open area 125 is integrated with the open areas of both the reception terminal 112b and the antenna terminal 112c. However, the open area according to the present invention can be changed to various embodiments as shown in Figs. 4A and 4B.

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Referring to Fig. 4A, the dielectric block 201 has an upper surface 203, a lower surface, and a side surface 205. A series of resonating holes 207 are formed in the dielectric block 201. A conductive material is coated on at least a part of the side surface 205 between the upper surface 203 and the lower surface, thus forming a ground electrode. The resonating holes 207 are also coated with a conductive material on at least a part of their internal surfaces, thereby forming resonators. The upper surface 203 is provided with an open area free from such a conductive material. At least one conductive pattern 209 is formed on the upper surface 203 of the dielectric block 201 at a position around each of the resonating holes 207 to be connected to the conductive layers on the internal surfaces of the resonating holes 207. The upper and side surfaces 203 and 205 of the dielectric block 201 are provided with transmission and reception terminals and an antenna terminal 212c 212a and 212b. The transmission terminal 212a, the reception terminal 212b and the antenna terminal 212c are insulated from the conductive material disposed on the side surface 205 of the dielectric block by open areas 214a, 214b and 214c, respectively.

The duplexer dielectric filter, as shown Fig. 4A, includes the open area 225 formed between the reception terminal 212b and the antenna terminal 212c, this being similar to the first embodiment of Fig. 3, but the open area 225 is isolated from the open areas of both the reception terminal 212b and the antenna terminal 212c.

The duplexer dielectric filter according to the third embodiment of the present invention, shown in Fig 4B, includes a plurality of the open areas 325a, 325b, 325c.

Referring to Fig. 4B, similar to the duplexer dielectric filter of Fig 4A, the duplexer dielectric filter comprises the dielectric block 301 having an upper surface 303, a lower surface, and a side surface 305. A series of resonating holes 307 are formed in the dielectric block 301. The resonating holes 307 are coated with a conductive material on

Cont'd Sub. B1

at least a part of their internal surfaces to form resonators. At least one conductive pattern 309 is formed on the upper surface 303 at a position around each of the resonating holes 307. The transmission and the reception terminals and an antenna terminal 312c, 312a and 312b. are disposed on upper and side surfaces 303 and 305 of the dielectric block 301, and are insulated from the conductive material disposed on the side surface 305 of the dielectric block by open areas 314a, 314b and 314c, respectively.

A10 Cont

The duplexer dielectric filter also comprises a number of open areas at positions corresponding to the conductive patterns 309 formed on the upper surface 303 of the dielectric block 301 as shown in Fig. 4B.

In the second and third embodiments, the open area 225 is not limited in its shape, but may be somewhat freely altered in shape while being spaced apart from the conductive patterns 209 by a desired distance. It is thus possible to form a desired loading capacitance. Particularly in the third embodiment of Fig. 4B, the desired loading capacitance may be more easily formed by making the sizes of the open areas 325, corresponding to the conductive patterns 309, different from each other.

~~Rewrite the paragraph spanning pages 17 and 18 as follows:~~

A11 Sub. B2

Fig. 6A is a perspective view showing the construction of a duplexer dielectric filter in accordance with the fourth embodiment of the present invention. Fig. 6B is an equivalent circuit diagram of the duplexer dielectric filter of Fig. 6A. In the fourth embodiment, the general shape of the duplexer dielectric filter remains the same as that described for the primary embodiment of Fig. 3, but the structure of the open area 325 is altered. Referring to Fig 6A, the diplexer dielectric filter according to the fourth embodiment comprises the dielectric block 401 having an upper surface 403, a lower surface, and a side surface 405. A series of resonating holes 407 are formed in the dielectric block 401. The resonating holes 407 are coated with a conductive material on at least a part of their internal surfaces to form resonators. At least one conductive pattern 409 is formed on the upper surface 403 at a position around each of the resonating holes 407. The transmission and the reception terminals and an

antenna terminal 412c, 412a and 412b. are disposed on upper and side surfaces 403 and 405 of the dielectric block 401, and are insulated from the conductive material disposed on the side surface 405 of the dielectric block by open areas 414a, 414b and 414c, respectively.

Rewrite the paragraph on page 18 at lines 8-19 as follows:

In the duplexer dielectric filter according to the fourth embodiment shown in Fig. 6A, an open area 425, having a predetermined size, is formed on the side surface 405 of the dielectric block 401 at a position corresponding to the resonating holes 407 within the reception area. A conductive pattern 430, having a predetermined length, is formed on the open area 425. In the fourth embodiment, the conductive pattern 430 extends in parallel to the side between the upper surface 403 and the side surface 405 of the dielectric block 401. However, it should be understood that the conductive pattern 430 may extend while being inclined to the side between the upper surface 403 and the side surface 405.

Replace the paragraph spanning pages 18 and 19 with the following paragraphs:

As shown in the equivalent circuit diagram of Fig. 6B, the circuit part of the transmission area, including Cti(i=1,2,3), Ctij(i,j=1,2,3), Rti(i=1,2,3) and Mtij(i,j=1,2,3) can be described as the one of the transmission area of Fig 2.

The conductive pattern 430 acts as a means for giving a capacitance C'r2 to the resonator R'r2 within the reception area. Due to the capacitance C'r2 added to the resonator R'r2, it is possible for the duplexer dielectric filter to accomplish a desired reduction ratio at a low frequency band within the reception area, thus improving the signal filtering effect of the duplexer dielectric filter. The value of the capacitance is controllable by changing the length of the conductive pattern 430 of Fig. 6A. That is, a capacitance is formed between the conductive pattern 430 and the resonating holes 407 of the reception area in accordance with the overlapped structure of the conductive pattern 430 and the resonating holes 407, thus finally forming the desired capacitance C'r2. The value of the capacitance C'r2 is changed

in accordance with the distance between the conductive pattern 430 of the open area 425 and the conductive patterns 409 around the resonating holes 407. That is, the value of the capacitance C'r2 is increased in proportion to the distance between the conductive pattern 430 of the open area 425 and the conductive patterns 409 around the resonating holes 407.

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~~*Replace* the paragraph on page 19 at lines 17-23 with the following:~~

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In the fourth embodiment of the present invention, it is possible to form two or more conductive patterns 430 on the dielectric block 401. In addition, the shape of the open area 425 is not limited. That is, the conductive pattern 430 of the fourth embodiment may be formed on an open area having any shape in addition to the shapes shown in Figs. 3, 4a and 4b without affecting the functioning of this invention.

In the Claims:

A14

1. (Amended) A duplexer dielectric filter, comprising:

a dielectric block having an upper surface, a lower surface, and a side surface, with a conductive material coated on at least a part of the lower and side surfaces;

a reception area for filtering signals received by the filter, said reception area including a plurality of resonators each of which has a first resonating hole, said first resonating hole completely extending from the upper surface to the lower surface of said dielectric block and being at least partially coated with a conductive material on the internal surface thereof;

a transmission area for filtering signals to be transmitted, said transmission area including plurality of resonators each of which has a second resonating hole, said second resonating hole completely extending from the upper surface to the lower surface of said dielectric block and being at least partially coated with a conductive material on the internal surface thereof;

reception and transmission terminals for accomplishing signal reception and transmission operation, said reception and transmission terminals respectively

comprising an electrode area insulated from the conductive material coated on the side surface of the dielectric block;

an antenna terminal arranged between said first and second filtering areas and comprising an electrode area insulated from the conductive material coated on the side surface of the dielectric block; and

a first open area disposed on at least a part of said side surface of the dielectric block at a position corresponding to the reception area while being free from a conductive material, said first open area controlling both a coupling capacitance and a loading capacitance of at least one of the resonators within the reception area, which is adjacent thereto.

2. (Amended) The duplexer dielectric filter according to claim 1, wherein said reception terminal, transmission terminal and antenna terminal are insulated from the conductive material disposed on the side surface of the dielectric block by a second open area.

3. (Amended) The duplexer dielectric filter according to claim 1, wherein said coupling capacitance and loading capacitance of at least one of the resonators within the reception area are changed in accordance with a size of said first open area.

6. (Amended) The duplexer dielectric filter according to claim 1, further comprising at least a third open area disposed on another part of said side surface of the dielectric block at a position corresponding to the reception area while being free from a conductive material, said at least a third open area controlling both a coupling capacitance and a loading capacitance of at least one of said resonators within the reception area, which is adjacent thereto.

7. (Amended) The duplexer dielectric filter according to claim 1, further comprising at least one conductive pattern, said conductive pattern being disposed on said dielectric block within the first open area, with a capacitance formed between

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said conductive pattern and the resonating hole of the first filtering area, thus forming an attenuation pole.

8. (Amended) The duplexer dielectric filter according to claim 7, wherein said conductive pattern is disposed along the resonating hole within the reception area.

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9. (Amended) The duplexer dielectric filter according to claim 7, wherein said capacitance is changed in accordance with a length of said conductive pattern corresponding to the resonating hole within the reception area.

10. (Amended) The duplexer dielectric filter according to claim 7, wherein said capacitance is changed in accordance with a distance between said conductive pattern and said resonating hole within the reception area.

Cancel claim 11 without prejudice.

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12. (Amended) A duplexer dielectric filter, comprising:

a dielectric block having an upper surface, a lower surface, and a side surface, with a conductive material coated on at least a part of the lower and side surfaces;

a reception area for filtering a received signal, said reception area comprising a resonator including a first resonating hole, said first resonating hole completely extending from the upper surface to the lower surface of said dielectric block while being at least partially coated with a conductive material on its internal surface;

a transmission area for filtering a signal to be transmitted, said transmission area comprising a resonator including a second resonating hole, said second resonating hole completely extending from the upper surface to the lower surface of said dielectric block while being at least partially coated with a conductive material on its internal surface;

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a transmission terminal for accomplishing a signal transmission operation, said transmission terminal comprising an electrode area formed on the upper and side surfaces of the dielectric block at a position corresponding to the transmission area while being insulated from the conductive material coated on the side surface of the dielectric block;

a reception terminal for accomplishing a signal reception operation, said reception terminal comprising an electrode area formed on the upper and side surfaces of the dielectric block at a position corresponding to the reception area while being insulated from the conductive material coated on the side surface of the dielectric block;

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an antenna terminal arranged between said reception and transmission areas and comprising an electrode area insulated from the conductive material coated on the side surface of the dielectric block; and

an open area disposed on at least a part of said side surface of the dielectric block at a position corresponding to the reception area while being free from a conductive material, said open area controlling both a coupling capacitance and a loading capacitance of the resonator within the reception area.

B. Version with Markings to Show Changes Made

Please amend the application as follows:

In the Drawings:

Attached are prints showing proposed drawing changes.

In the Specification:

Rewrite the paragraph on page 1 at lines 16 - 23 to read:

As is well known to those skilled in the art and the general public, mobile communication systems using super high frequency band waves have been largely substituted for conventional wire communication systems. Therefore, cellular phones are widely used and are subjected to active research and development to improve their operational performance and [keep up with the recent trend toward] achieve the desired compactness, smallness and lightness thereof.

Rewrite the first paragraph on page 3 to read:

A conductive pattern 9, having a predetermined size, is formed on the upper surface 3 of the dielectric block 1 at a position around each of the resonating holes 7. Such conductive patterns 9 are connected to the conductive layers on the internal surfaces of the resonating holes 7, thus forming a loading capacitance between the resonating holes 7 and the conductive layer of the side surface 5, and forming a coupling capacitance between neighboring resonators. The resonance frequency of the resonators is determined by both the resonating holes 7 and the loading capacitance, while the coupling capacitance couples the resonators to each other. The transmission area 10 and the reception area 20 of the upper and side surfaces 3 and 5 of the dielectric block 1 are provided with transmission and reception terminals 12a and 12b for accomplishing the signal transmission and reception operation. An antenna terminal 12c, consisting of a conductive pattern, is formed at a position between the transmission and reception areas 10 and 20. The transmission terminal 12a, the reception terminal 12b and the antenna terminal 12c are insulated from the conductive material disposed on the side surface 5 of the dielectric block by open areas 14a, 14b and 14c, respectively.

Rewrite the paragraph spanning pages 3 and 4 as follows:

Fig. 2 is an equivalent circuit diagram of the duplexer dielectric filter of Fig. 1. In [the drawing] Fig. 2, the reference character "R" denotes transmitting lines, each of which is always opened at one end thereof by an associated resonating hole 7 of the dielectric block 1. As described above, he antenna terminal is disposed between the transmission area and the reception area. The elements related to the resonating holes 7 within the transmission area are indicated by the reference labels including the character "t", for example, Cti, Ctij, Rti and Mtij, while the elements related to the

resonating holes 7 within the reception area are indicated by the reference labels including the character "r", for example, Cri, Crij, Rri and Mrij. The loading capacitance Cti, Cri [(i = 1, 2, . . .)] (i = 1, 2, 3), formed between the resonating holes 7 and the conductive layer on the side surface 5 of the dielectric block 1, is connected to the open ends of the signal transmitting lines. A desired resonating circuit is formed by both the signal transmitting lines Rti, Rri [(i = 1, 2, . . .)] (i = 1, 2, 3) and the loading capacitance.

Rewrite the paragraph on page 4 at lines 5-20 as follows:

In a conventional duplexer dielectric filter, it is necessary to accomplish both desired signal transmitting characteristics within a transmission frequency band and desired attenuation characteristics within a low frequency band. The desired transmission characteristics within the transmission frequency band are determined by a coupling of the resonance frequency of the resonators, determined by both the signal transmitting lines Rti, Rri and the loading capacitance Cti, Cri, the coupling capacitance Ctij, Crij [(i,j = 1, 2, . . .)] (i,j = 1, 2, 3), and electromagnetic coupling values Mtij, Mrij [(i,j = 1, 2, . . .)] (i,j = 1, 2, 3). The desired attenuation characteristics within the low frequency band are determined by a coupling. That is, both the attenuation characteristics and the frequency of an attenuation pole are determined by a combination of the coupling capacitance and magnetic coupling values.

Rewrite the paragraph on page 5 at lines 7-15 as follows:

In such a conventional duplexer dielectric filter of Fig. 1, the determination of the resonance frequency or the coupling between the resonators are changed in accordance with the size of the conductive patterns 9 formed on the upper surface 3 of the dielectric block 1. In other words, the operational characteristics of the duplexer dielectric filters are changed in accordance with both the gap between the conductive patterns 9 and the conductive layer of the side surface 5, and the gap between the conductive patterns 9.

Rewrite the paragraph on page 12 at lines 5-17, as follows:

At least one conductive pattern 109, having a predetermined size, is formed on the upper surface 103 of the dielectric block 101 at a position around each of the resonating holes 107. Such conductive patterns 109 are connected to the conductive layers on the internal surfaces of the resonating holes 107, thus forming loading capacitance between the resonating holes 107 and the conductive layer of the side surface 105 and forming coupling capacitance between neighboring resonators. The upper and side surfaces 103 and 105 of the dielectric block 101 are provided with transmission and reception terminals 112a and 112b for accomplishing the transmission and reception operation in addition to an antenna terminal 112c. The transmission terminal 112a, the reception terminal 112b and the antenna terminal 112c are insulated from the conductive material disposed on the side surface 5 of the dielectric block by open areas 114a, 114b and 114c, respectively.

Rewrite the paragraph spanning pages 12 and 13 as follows:

The duplexer dielectric filter of this invention has two filtering areas: a [first filtering] reception area and a [second filtering] transmission area. [When the received signal from the antenna terminal is filtered by the first filtering area, the second filtering area filters the signal to be transmitted from the end of an antenna. As is well known to those to skilled in the art, it is not always necessary to specifically designate the reception area and the transmission area in a conventional dielectric filter. In addition, the reception area and the transmission area in a duplexer dielectric filter having the same construction may be changed in accordance with the manufacturer's wishes. Therefore, it should be understood that the designation of the reception area and the transmission area in the duplexer dielectric filter of this invention is only for ease of description, but is not to be interpreted as, or used for, any limitation of this invention.]

Rewrite the paragraph spanning pages 13 and 14 as follows:

An open area 125 free from any conductive layer is formed on the side surface 105 of the dielectric block 101 within the reception area 120 and is integrated with the other open areas 114b and 114c. The open area 125 controls both the loading capacitance formed between the conductive patterns 109 within the reception area 120 and the ground electrode of the side surface 105 and the coupling capacitance between the conductive patterns 109. The control of both the loading capacitance and the coupling capacitance will be described in detail as follows, with reference to Figs. [5a and 5b] 5A and 5B.

Rewrite the paragraph on page 14 at lines 8-19 as follows:

Similar to the transmission area of the duplexer dielectric filter as shown in Fig. 3, [When] when two resonators R1, R2 are formed between the ground electrodes in the same manner as expected from a conventional duplexer dielectric filter as shown in Fig. 5A, a loading capacitance [2Ct1, 2Ct2] Ct1, Ct2 (Ct1 is a random value) is formed between the resonators R1, R2 and the ground electrodes. In addition, a coupling capacitance [1Ct12] Ct12 (Ct12 is a random value) is formed between the resonators R1, R2. On the other hand, similar to the reception area of the duplexer dielectric filter as shown in Fig. 3, when the ground electrode is partially open as expected from the present invention as shown in Fig. 5B, a loading capacitance [1Ct1] Cr3, Cr4 is formed between the resonators [R1, R2] R3, R4 and the ground electrodes. In addition, a coupling capacitance [2Ct12] Cr34 is formed between the resonators [R1, R2] R3, R4.

Rewrite the paragraph on page 15 at lines 10-19 as follows:

The loading capacitance, formed between the conductive patterns 109 and the ground electrodes, is changed in accordance with the distance between the conductive patterns 109 and the ground electrodes. It is thus possible to control the loading capacitance of the resonating holes 107 by changing the distance between the ground electrodes and the resonating holes 107 within the reception area 120. This may be

accomplished by changing the shape of the open area 125, for example, by forming a step on the open area 125 as shown in [the drawing] Fig. 3.

Replace the paragraph on page 17 at lines 4-24 with the following paragraphs:

As described above, the shape of the open area 125 in the duplexer dielectric filter of this invention is not limited. In the primary embodiment of Fig. 3, the open area 125 is integrated with the open areas of both the reception terminal 112b and the antenna terminal 112c. However, the open area according to the present invention can be changed to various embodiments as shown in Figs. 4A and 4B. [in the second embodiment of Fig. 4A, the open area 225 may be formed to be isolated from the open areas of both the reception terminal 212b and the antenna terminal 212c.]

Referring to Fig. 4A, the dielectric block 201 has an upper surface 203, a lower surface, and a side surface 205. A series of resonating holes 207 are formed in the dielectric block 201. A conductive material is coated on at least a part of the side surface 205 between the upper surface 203 and the lower surface, thus forming a ground electrode. The resonating holes 207 are also coated with a conductive material on at least a part of their internal surfaces, thereby forming resonators. The upper surface 203 is provided with an open area free from such a conductive material. At least one conductive pattern 209 is formed on the upper surface 203 of the dielectric block 201 at a position around each of the resonating holes 207 to be connected to the conductive layers on the internal surfaces of the resonating holes 207. The upper and side surfaces 203 and 205 of the dielectric block 201 are provided with transmission and reception terminals and an antenna terminal 212c, 212a and 212b. The transmission terminal 212a, the reception terminal 212b and the antenna terminal 212c are insulated from the conductive material disposed on the side surface 205 of the dielectric block by open areas 214a, 214b and 214c, respectively.

The duplexer dielectric filter, as shown Fig. 4A, includes the open area 225 formed between the reception terminal 212b and the antenna terminal 212c, this being similar to the first embodiment of Fig. 3, but the open area 225 is isolated from the open areas of both the reception terminal 212b and the antenna terminal 212c.

The duplexer dielectric filter according to the third embodiment of the present invention, shown in Fig 4B, includes a plurality of the open areas 325a, 325b, 325c.

Referring to Fig. 4B, similar to the duplexer dielectric filter of Fig 4A, the duplexer dielectric filter comprises the dielectric block 301 having an upper surface 303, a lower surface, and a side surface 305. A series of resonating holes 307 are formed in the dielectric block 301. The resonating holes 307 are coated with a conductive material on at least a part of their internal surfaces to form resonators. At least one conductive pattern 309 is formed on the upper surface 303 at a position around each of the resonating holes 307. The transmission and the reception terminals and an antenna terminal 312c, 312a and 312b. are disposed on upper and side surfaces 303 and 305 of the dielectric block 301, and are insulated from the conductive material disposed on the side surface 305 of the dielectric block by open areas 314a, 314b and 314c, respectively.

The duplexer dielectric filter also comprises a number of open areas at positions corresponding to the conductive patterns 309 formed on the upper surface 303 of the dielectric block 301 as shown in Fig. 4B. [In addition, it is also possible to

form a number of open areas at positions corresponding to the conductive patterns 209 formed on the upper surface 203 of the dielectric block 101 as shown in Fig. 4B, showing the third embodiment of the present invention.]

In the second and third embodiments, the open area 225 is not limited in its shape, but may be somewhat freely altered in shape while being spaced apart from the conductive patterns 209 by a desired distance. It is thus possible to form a desired loading capacitance. Particularly in the third embodiment of Fig. 4B, the desired loading capacitance may be more easily formed by making the sizes of the open areas [225] 325, corresponding to the conductive patterns [209] 309, different from each other.

Rewrite the paragraph spanning pages 17 and 18 as follows:

Fig. 6A is a perspective view showing the construction of a duplexer dielectric filter in accordance with the fourth embodiment of the present invention. Fig. 6B is an equivalent circuit diagram of the duplexer dielectric filter of Fig. 6A. In the fourth embodiment, the general shape of the duplexer dielectric filter remains the same as that described for the primary embodiment of Fig. 3, but the structure of the open area 325 is altered. Referring to Fig 6A, the diplexer dielectric filter according to the fourth embodiment comprises the dielectric block 401 having an upper surface 403, a lower surface, and a side surface 405. A series of resonating holes 407 are formed in the dielectric block 401. The resonating holes 407 are coated with a conductive material on at least a part of their internal surfaces to form resonators. At least one conductive pattern 409 is formed on the upper surface 403 at a position around each of the resonating holes 407. The transmission and the reception terminals and an antenna terminal 412c, 412a and 412b, are disposed on upper and side surfaces 403 and 405 of the dielectric block 401, and are insulated from the conductive material disposed on the side surface 405 of the dielectric block by open areas 414a, 414b and 414c, respectively.

Rewrite the paragraph on page 18 at lines 8-19 as follows:

In the duplexer dielectric filter according to the fourth embodiment shown in Fig. 6A, an open area [325] 425, having a predetermined size, is formed on the side surface [305] 405 of the dielectric block [301] 401 at a position corresponding to the resonating holes [307] 407 within the reception area. A conductive pattern [330] 430, having a predetermined length, is formed on the open area [325] 425. In the fourth embodiment, the conductive pattern [330] 430 extends in parallel to the side between the upper surface [303] 403 and the side surface [305] 405 of the dielectric block [301] 401. However, it should be understood that the conductive pattern [330] 430 may extend while being inclined to the side between the upper surface [303] 403 and the side surface [305] 405.

Replace the paragraph spanning pages 18 and 19 with the following paragraphs:

As shown in the equivalent circuit diagram of Fig. 6B, the circuit part of the transmission area, including Cti(i=1,2,3), Ctij(i,j=1,2,3), Rti(i=1,2,3) and Mtij(i,j=1,2,3) can be described as the one of the transmission area of Fig 2.

The conductive pattern [330] 430 acts as a means for giving a capacitance [Cr2'] C'r2 to the resonator [Rr2'] R'r2 within the reception area [of the reception terminal]. Due to the capacitance [Cr2'] C'r2 added to the resonator [Rr2'] R'r2, it is possible for the duplexer dielectric filter to accomplish a desired reduction ratio at a low frequency band within the reception area, thus improving the signal filtering effect of the duplexer dielectric filter. The value of the capacitance is controllable by changing the length of the conductive pattern [330] 430 of Fig. 6A. That is, a capacitance is formed between the conductive pattern [330] 430 and the resonating holes [307] 407 of the reception area in accordance with the overlapped structure of the conductive pattern [330] 430 and the resonating holes [307] 407, thus finally forming the desired capacitance [Cr2'] C'r2. The value of the capacitance [Cr2'] C'r2 is changed in accordance with the distance between the conductive pattern [330] 430 of the open area [325] 425 and the conductive patterns [309] 409 around the resonating holes [307] 407. That is, the value of the capacitance [Cr2'] C'r2 is increased in proportion to the distance between the conductive pattern [330] 430 of the open area [325] 425 and the conductive patterns [309] 409 around the resonating holes [307] 407.

Replace the paragraph on page 19 at lines 17-23 with the following:

In the fourth embodiment of the present invention, it is possible to form two or more conductive patterns [330] 430 on the dielectric block [301] 401. In addition, the shape of the open area [325] 425 is not limited. That is, the conductive pattern [330] 430 of the fourth embodiment may be formed on an open area having any shape in addition to the shapes shown in Figs. 3, 4a and 4b without affecting the functioning of this invention.

In the Claims:

1. (Amended) A duplexer dielectric filter, comprising:

a dielectric block having an upper surface, a lower surface, and a side surface, with a conductive material coated on at least a part of the lower and side surfaces;

a [first filtering] reception area for filtering [first] signals received by the filter, said [first filtering] reception area including [at least one resonator having] a plurality of resonators each of which has a first resonating hole, said first resonating hole completely extending from the upper surface to the lower surface of said dielectric block and being at least partially coated with a conductive material on [its] the internal surface thereof;

a [second filtering] transmission area for filtering [second] signals to be transmitted, said [second filtering] transmission area including [at least one resonator having] a plurality of resonators each of which has a second resonating hole, said second resonating hole completely extending from the upper surface to the lower

surface of said dielectric block and being at least partially coated with a conductive material on [its] the internal surface thereof;

reception and transmission terminals for accomplishing signal reception and transmission operation, said reception and transmission terminals respectively comprising an electrode area insulated from the conductive material coated on the side surface of the dielectric block;

an antenna terminal arranged between said first and second filtering areas and comprising an electrode area insulated from the conductive material coated on the side surface of the dielectric block; and

a first open area [formed] disposed on at least a part of said side surface of the dielectric block at a position corresponding to the [first filtering] reception area while being free from a conductive material, said first open area controlling both a coupling capacitance and a loading capacitance of at least one of the resonators within the reception area, which is adjacent thereto.

2. (Amended) The duplexer dielectric filter according to claim 1, wherein said reception terminal, transmission terminal and antenna terminal are insulated from the conductive material [formed] disposed on the side surface of the dielectric block by a second open area.

3. (Amended) The duplexer dielectric filter according to claim 1, wherein said coupling capacitance and loading capacitance of at least one of the resonators within the reception area are changed in accordance with a size of said first open area.

6. (Amended) The duplexer dielectric filter according to claim 1, [wherein two or more resonators are formed in the first filtering area of the dielectric block, with a plurality of first open areas being formed on the side surface of the dielectric block at positions corresponding to said resonators within the first filtering area] further comprising at least a third open area disposed on another part of said side surface of the dielectric block at a position corresponding to the reception area while being free from a conductive material, said at least a third open area controlling both a coupling capacitance and a loading capacitance of at least one of said resonators within the reception area, which is adjacent thereto.

7. (Amended) The duplexer dielectric filter according to claim 1, further comprising at least one conductive pattern, said conductive pattern being [formed] disposed on said dielectric block within the first open area, with a capacitance formed between said conductive pattern and the resonating hole of the first filtering area, thus forming an attenuation pole.

8. (Amended) The duplexer dielectric filter according to claim 7, wherein said conductive pattern is [formed] disposed along the resonating hole within the [first filtering] reception area.

9. (Amended) The duplexer dielectric filter according to claim 7, wherein said capacitance is changed in accordance with a length of said conductive pattern corresponding to the resonating hole within the [first filtering] reception area.

10. (Amended) The duplexer dielectric filter according to claim 7, wherein said capacitance is changed in accordance with a distance between said conductive pattern and said resonating hole within the [first filtering] reception area.

Cancel claim 11 without prejudice.

12. (Amended) A duplexer dielectric filter, comprising:

a dielectric block having an upper surface, a lower surface, and a side surface, with a conductive material coated on at least a part of the lower and side surfaces;

a reception area for filtering a received signal, said reception area comprising [at least one] a resonator including a first resonating hole, said first resonating hole completely extending from the upper surface to the lower surface of said dielectric block while being at least partially coated with a conductive material on its internal surface;

a transmission area for filtering a signal to be transmitted, said transmission area comprising [at least one] a resonator including a second resonating hole, said second resonating hole completely extending from the upper surface to the lower surface of said dielectric block while being at least partially coated with a conductive material on its internal surface;

a transmission terminal for accomplishing a signal transmission operation, said transmission terminal comprising an electrode area formed on the upper and side surfaces of the dielectric block at a position corresponding to the transmission area while being insulated from the conductive material coated on the side surface of the dielectric block;

a reception terminal for accomplishing a signal reception operation, said reception terminal comprising an electrode area formed on the upper and side surfaces of the dielectric block at a position corresponding to the reception area while being insulated from the conductive material coated on the side surface of the dielectric block;

an antenna terminal arranged between said reception and transmission areas and comprising an electrode area insulated from the conductive material coated on the side surface of the dielectric block; and

an open area [formed] disposed on at least a part of said side surface of the dielectric block at a position corresponding to the reception area while being free from a conductive material, said open area controlling both a coupling capacitance and a loading capacitance of the [resonators] resonator within the reception area.